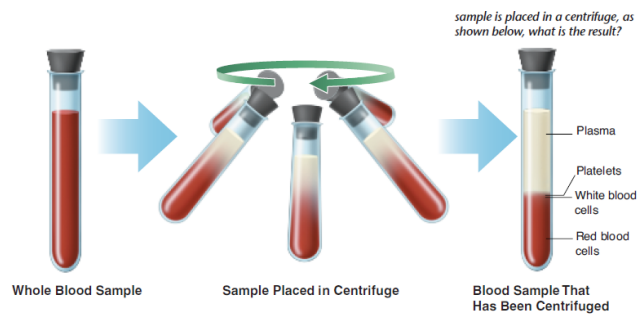


Components of Blood

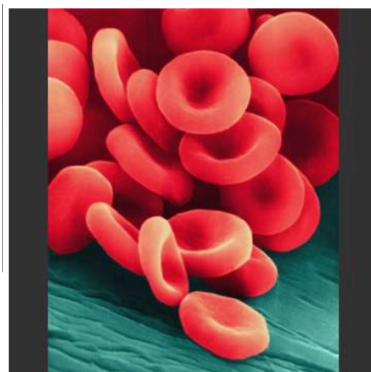
- 55% of blood is plasma.
- plasma is mostly water (90%).
- plasma also has O_2 , CO_2 , salts, nutrients, enzymes, hormones, **proteins**, waste products.
- other 45% of blood is red and white blood cells and platelets (white blood cells are not very numerous, unless an infection is occurring)



Red Blood Cells

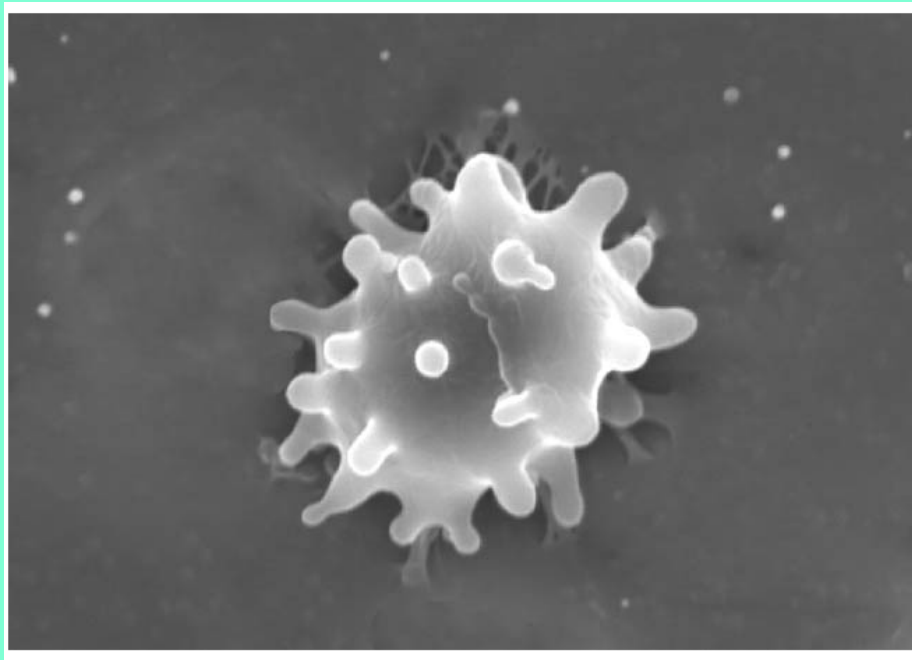
- known as *Erythrocytes*.
- produced in bone marrow.
- red blood cells contain molecules called hemoglobin.
- O_2 binds to hemoglobin.
- red blood cells last for about 120 days.
- they wear out by squeezing in and out of the capillaries.
- the worn out ones are removed by the spleen or liver.
- Anemia - low hemoglobin levels
- makes person feel tired.
- must supplement diet or eat iron rich foods (eg. raisins, liver, green vegetables)

Why don't red blood cells have/need a nucleus? 2 reasons?



White Blood Cells

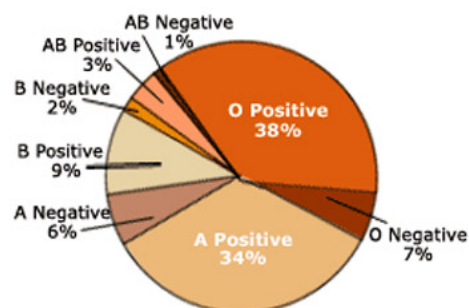
- known as *Leucocytes*
- no hemoglobin; therefore, not red.
- produced in bone marrow.
- attack foreign substances or organisms that enter blood; engulf them (phagocytosis) or secrete chemicals that fight off disease.
- an increased number of white blood cells will occur when an infection takes place.



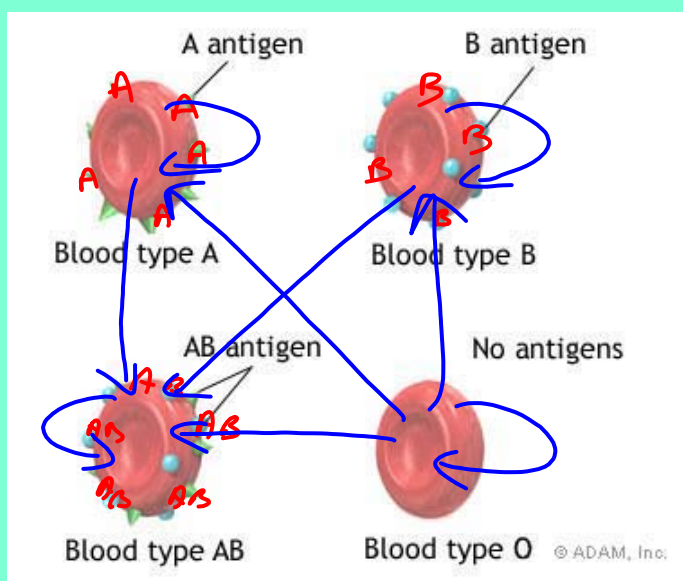
Blood Types

- 4 basic blood types : A, B, AB and O
- the different types are based on the type of antigens (glycoproteins) found in the membrane of the red blood cells.
- when an antigen of 1 blood type encounters an antigen of another blood type --- antibodies are produced to fight the different blood cell.
- the antibodies cause the foreign blood to clump together - called agglutination.
- clumped blood cannot pass through blood vessels easily; therefore, O₂ does not get exchanged.

Blood Type Percentages



Blood Donation



Rh Factor

- Another antigen on the red blood cells is rhesus or Rh.
- Most people (85%) have this antigen and are Rh⁺, those who don't are Rh⁻.
- ✖ ● Rh⁻ - can donate to both Rh⁺ and Rh⁻ but Rh⁺ can only donate to Rh⁺
- sometimes problems between a mother and a baby arise because of Rh.
- the mother maybe Rh⁻ and the baby maybe Rh⁺ (from the father)
- the mother then produces antibodies against Rh⁺.
- this does not affect the first born but could the second or third as the mother now has antibodies to attack the different blood
- a serum is given to prevent the production of antibodies after each child birth

A^+ can donate to --- A^+ , ~~B^+~~ , AB^+ , ~~O^+~~
 A^- can donate to --- A^- , AB^- , A^+ , AB^+
 B^+ --- B^+ , AB^+ ✓
 B^- --- B^- , B^+ , AB^+ , AB^-
 AB^+ —————→ AB^+ universal recipient !
 AB^- —————→ AB^+ , AB^-
 O^+ —→ AB^+ , A^+ , B^+ , O^+
 O^- —→ everyone ⇒ universal donor